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Association of some spiders with ants

by

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ABSTRACT

Spiders and syntopic ants have been collected in the field. Four spider species were relatively abundant, among them the myrmecophagous *Callilepis nocturna* (L.) and *Zodarion gallicum* (Canestrini). *Phrurolithus festivus* (C. L. Koch) is obviously myrmecophilous. *Aulonia albimana* (Walckenaer) was also always associated with ants, but this seems to be an indirect consequence of the same search, by the spider and the ants, for a place under a stone.

INTRODUCTION

In Europe, the spiders which are well known to feed exclusively on ants belong to the gnaphosid genus *Callilepis* (HELLER 1976) and the zodariid genus *Zodarion* (HARKNESS 1977, COUVREUR 1989). Species like *Oecobius annulipes* Lucas (GLATZ 1967) and some theridiids have also been observed feeding on ants. In the field, especially the ants of the genera *Formica*, *Lasius* (Formicinae), and *Tapinoma* (Dolichoderinae) are preyed. The preference for only some ant taxa is certainly determined by several eco-ethological factors. Moreover, physiological differences between ants seem to make them more or less sensitive to the spider venom. Formicines and *Tapinoma* are rapidly paralysed when bitten by *Callilepis nocturna* during experiments in the laboratory. In contrast, myrmicines (*Myrmica*, *Tetramorium*, *Messor*, *Pheidole*, *Monomorium*) appear generally much more resistant (HELLER 1976).

The present field work gives some ecological details about four spider species which are either surely or possibly related to ants. It is discussed if a syntopy necessarily involves a direct relation between the arachnid and the insect, as for ant-eating or ant-resembling spiders.

MATERIAL AND METHODS

Spiders and ants have been collected in a stone-pit not in progress for over 40 years (Péry, Canton Bern, Switzerland). The arthropods have been collected from May 30 until June 14, 1990, between 11.00 a.m. and 5.00 p.m.

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When a spider was seen, it was captured as well as all syntopic ant species. An ant is defined as syntopic when observed in a ray of 20 cm around a spider and in the minute following the collection of a spider. Very often, stones have been turned up in order to look for spiders.

The spiders listed in Table 1 have been identified with HEIMER & NENTWIG (1991) and GRIMM (1985). The others (see Table 2) were identified by A. HÄNGGI (Basel). Ants of the genus *Lasius* have been identified with KUTTER (1977), whereas ants of the genera *Tapinoma*, *Myrmica*, and *Formica* were identified by C.A. COLLINGWOOD (Leeds, England).

RESULTS

A total of 85 spiders have been found. The most abundant species are listed in Table 1. *Aulonia albimana* (Lycosidae) is more frequently associated with *Tapinoma erraticum* in comparison to *Callilepis nocturna* and to *Phrurolithus festivus* (Liocranidae) which are both more associated with *Lasius niger* ($P < 0.005$ two times, Fisher exact probability test).

TABLE 1

Number of spiders often found associated with ants.

Spider species	Ant species				
	<i>Lasius niger</i>	<i>Tapinoma erraticum</i>	<i>Lasius flavus</i>	>1 sp ⁺	none
<i>Callilepis nocturna</i>	13	5	0	2	1
<i>Zodarion gallicum</i>	1	3	1	6	1
<i>Phrurolithus festivus</i>	9	2	0	5	4
<i>Aulonia albimana</i>	1	9	0	4	0

(⁺) At least two of the following species: *Lasius niger* (L.), *L. flavus* (Fabr.), *Tapinoma erraticum* (Latr.), *Myrmica sabuleti* Mein., *Formica cunicularia* Latr.

The number of males, females, and juveniles was 2, 16, and 0 respectively for *Callilepis nocturna*; 9, 1, and 2 for *Zodarion gallicum*; 11, 7, and 2 for *Phrurolithus festivus*; and 8, 2, and 4 for *Aulonia albimana*. All spiders were generally found under stones. Individuals of a same species were found sometimes together in *C. nocturna* (all of them have then not been captured), *P. festivus*, and *A. albimana*. In the laboratory, 3 females of *C. nocturna* produced a cocoon from which hatched, 34-37 days later, 7, 8, and 12 individuals per cocoon. One *P. festivus* laid a cocoon from which hatched 4 individuals, 31 days later.

The remaining spider species are listed in Table 2. Only *Enoplognatha thoracica*, *Heliophanus flavipes*, and in a less extend *Drassodes lapidosus* are obviously thermo- and/or xerophilous (HEIMER & NENTWIG 1991). Spider species of Table 2 are not known to feed regularly on ants. The spider-ant association is probably more due to chance than to a trophic relation.

TABLE 2

Spiders found associated with ants, but less abundant than those listed in Table 1.

Spider species	Ant species		
	<i>Lasius niger</i>	<i>Tapinoma erraticum</i>	>1 sp ⁺
Gnaphosidae:			
<i>Drassodes lapidosus</i> (Walck.)	1 f		
<i>Drassodes</i> sp.		1 j	
<i>Zelotes</i> sp.			1 f sa
gnaphosid sp.		1 m sa	
Linyphiidae:			
<i>Diplocephalus cristatus</i> (Blackw.)	1 m		
<i>Meioneta rurestris</i> (C.L. Koch)	1 f		
<i>Walckenaeria vigilax</i> (Blackw.)		1 m	
linyphiid sp.	1 j		
Theridiidae:			
<i>Enoplognatha thoracica</i> (Hahn)	1 f	2 f, 1 m	
Salticidae:			
<i>Euophrys frontalis</i> (Walck.)	1 f		
<i>Evarcha arcuata</i> (Clerck)	1 m		
<i>Heliophanus flavipes</i> C.L. Koch		1 f	
Agelenidae:			
<i>Tegenaria</i> sp.	1 j		1 f sa
Thomisidae:			
<i>Xysticus</i> sp.		1 j	

(m) male, (f) female, (j) juvenile, (sa) subadult. (+) At least two of the following species: *Lasius niger*, *L. flavus*, *Tapinoma erraticum*, *Formica cunicularia*.

DISCUSSION

The ant *Lasius niger* was common on the studied area. Their nests are populous (KUTTER 1977), about five times more than those of *Tapinoma* (BECKERS *et al.* 1989). A probable consequence is that several individuals of *Callilepis nocturna* easily hunt *Lasius* workers of a same colony. Moreover, the spider is not aggressive against congeners (HELLER 1974) which allows a reciprocal proximity. This aggregation (which facilitates reproduction) is certainly without function during hunting. Indeed, cooperation is not needed for a spider when catching an ant as described by HELLER (1976).

Phrurolithus festivus is generally found with ants (Table 1) but, as far as I know, it is not preying on them. In any case, the myrmecophilous habit seems to be highly specialized: the spider looks and walks like an ant; it is found sometimes in close proximity to an

ant colony; like all liocranids, it probably builds no hunting-web (HEIMER & NENTWIG 1991); it has a low number of juveniles per cocoon. These characteristics are also encountered in other *Phrurolithus* species (BONARIC 1974, PENNIMAN 1978).

In the present paper, *Aulonia albigana* is observed probably for the first time specifically associated with ants. However, I do not believe the spider to be, therefore, necessarily myrmecophilous. The syntopy more probably results from several independent facts. On the first hand, *A. albigana* builds a web (JOB 1974). Thus, individuals can remain long times at the same place (on the contrary of *Callilepis*, *Zodarion*, or *Phrurolithus*). On the other hand, the settlement of *Tapinoma*'s colonies is particularly unstable; these ants move their nest very easily when they are disturbed (FOREL 1920). Finally, both the spider and the ants are generally found under stones. A competition certainly occurs for such places. Thus, it is possible that *A. albigana* only tolerates the momentary presence of a *Tapinoma*'s colony under a stone where the spider was already established, but not the permanent presence of other ant species. This could explain why the spider is frequently syntopic with *Tapinoma*, but rarely with *Lasius* (Table 1).

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RÉSUMÉ

Des araignées et des fourmis syntopiques ont été récoltées sur le terrain. Quatre espèces d'araignées sont relativement abondantes, parmi lesquelles *Callilepis nocturna* (L.) et *Zodarion gallicum* (Canestrini) qui sont l'une et l'autre myrmécophages. *Phrurolithus festinus* (C. L. Koch) est de toute évidence myrmécophile. *Aulonia albigana* (Walckenaer) est toujours associée à des fourmis, mais ceci semble être la conséquence indirecte de la recherche d'une même place sous une pierre de la part de l'araignée et des fourmis.

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